

UPSTREAM

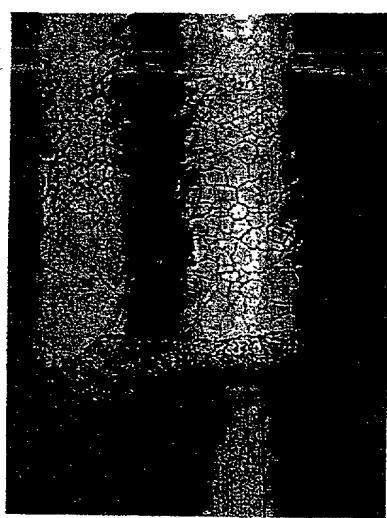
HEAT - AFFECTED PART



× 50

DOWNSTREAM

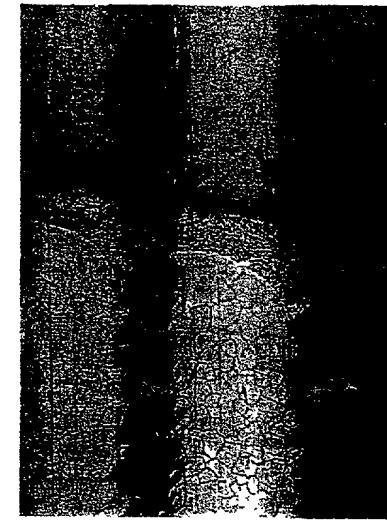
WELDED PART



× 100

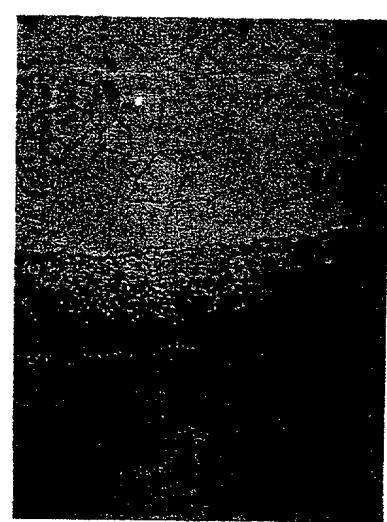
DOWNSTREAM

HEAT - AFFECTED PART

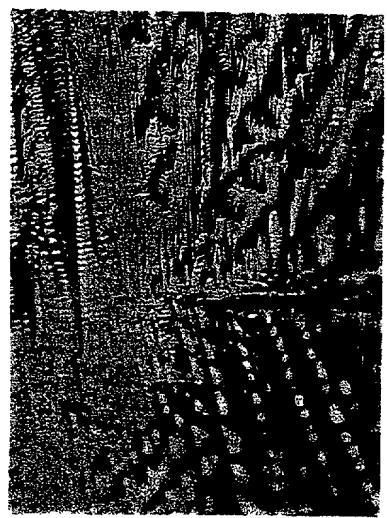
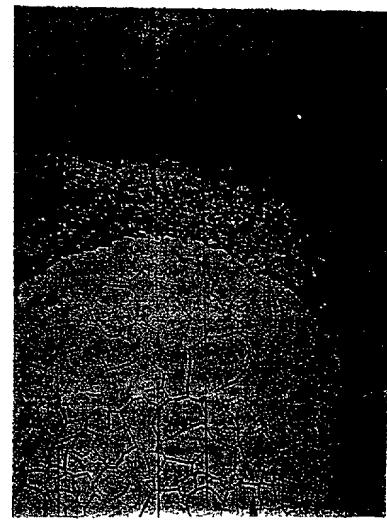


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Fig. 1



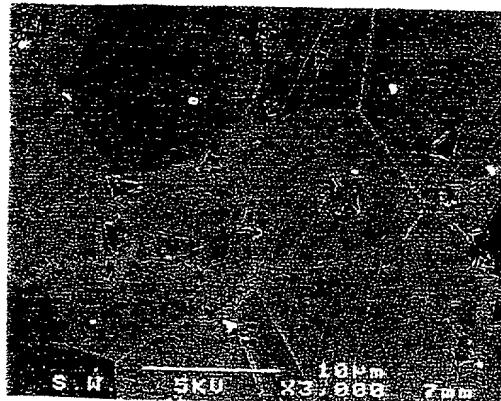
× 200



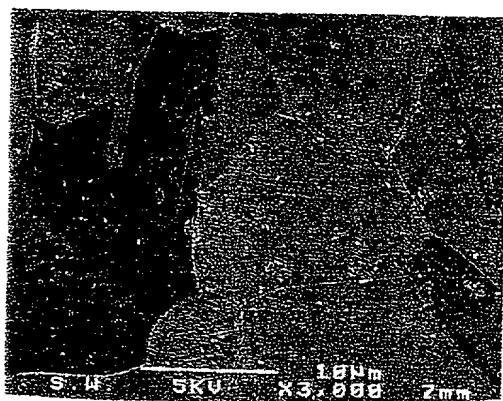
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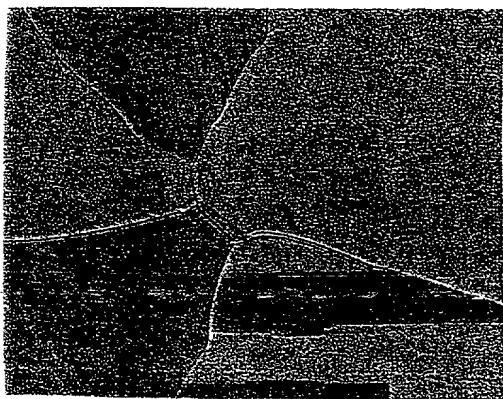
DOWNSTREAM



5mm



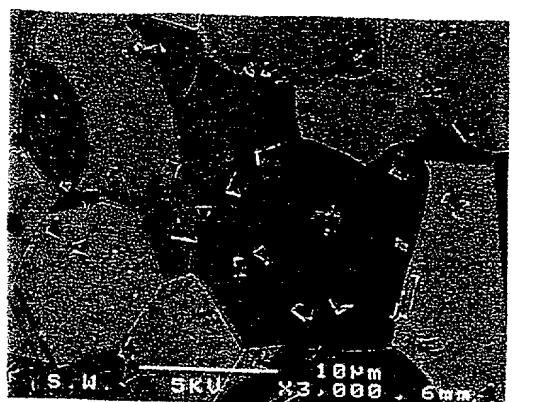
3mm



3mm



WELDED PART



5mm

UPSTREAM

[BACK SHIELD GAS :  
100 % Ar]

Fig. 3

### PARTICLE MEASUREMENTS AT WELDED PARTS

AT WELDING CONDITIONS (30rpm × 1rev. BEAD WIDTH 1mm) 9 WELDED SPOTS

FLOW RATE: 0.1cf/min (U - N<sub>2</sub>) , PARTICLE MEASUREMENT : 0.1 μm OR LARGER

BASE METAL	STAINLESS STEEL TUB SUBJECT TO FLUORID PASSIVATION TREATMENT				REGULAR STAINLESS STEEL		
	NO WELDING	CONVENTIONAL WELDING METHOD	WELDING AFTER FILM REMOVAL WITH HOT WATER (80°C)	WELDING AFTER FILM REMOVAL WITH 0.5%HF/10%H <sub>2</sub> O <sub>2</sub>		WELDING METHOD WITH 5% ADDED H <sub>2</sub>	CONVENTIONAL WELDING METHOD
NO HAMMERING (10min)	0	0	0	0	0	0	0
WITH HAMMERING (10min)	0	60	0	0	0	0	0

Fig. 4

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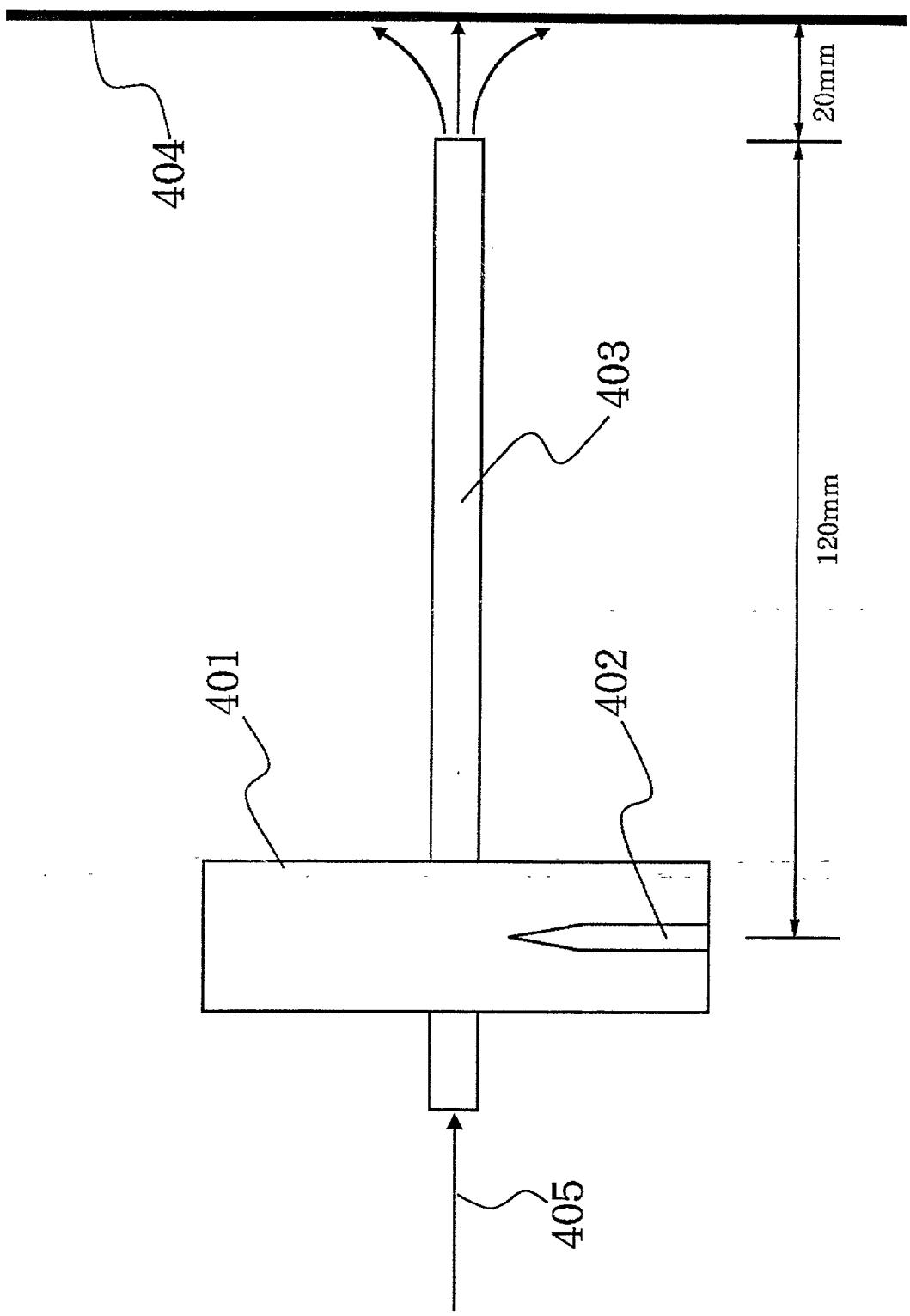
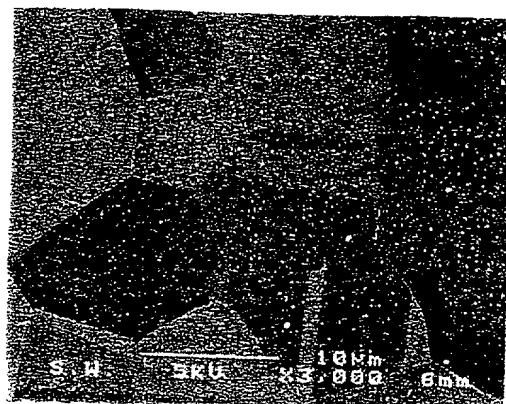


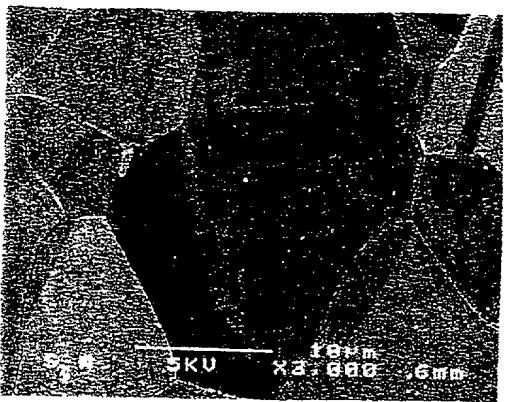
Fig. 5

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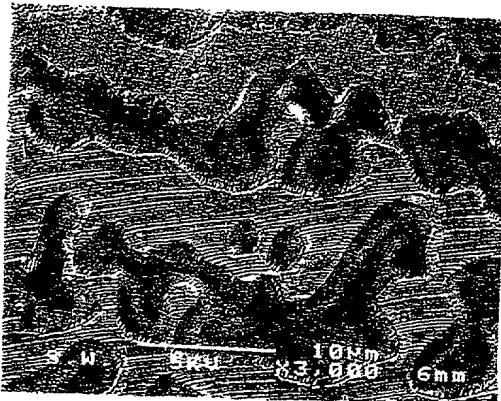
DOWNSTREAM



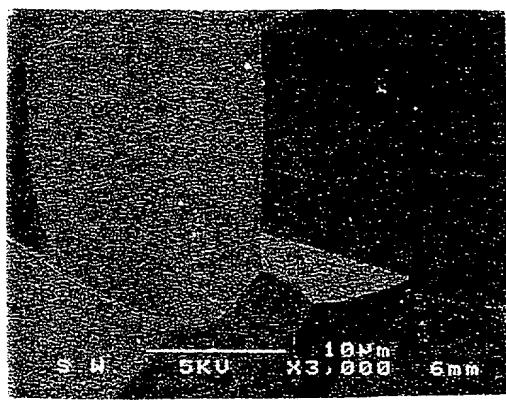
5mm



3mm



WELDED PART



5mm      UPSTREAM

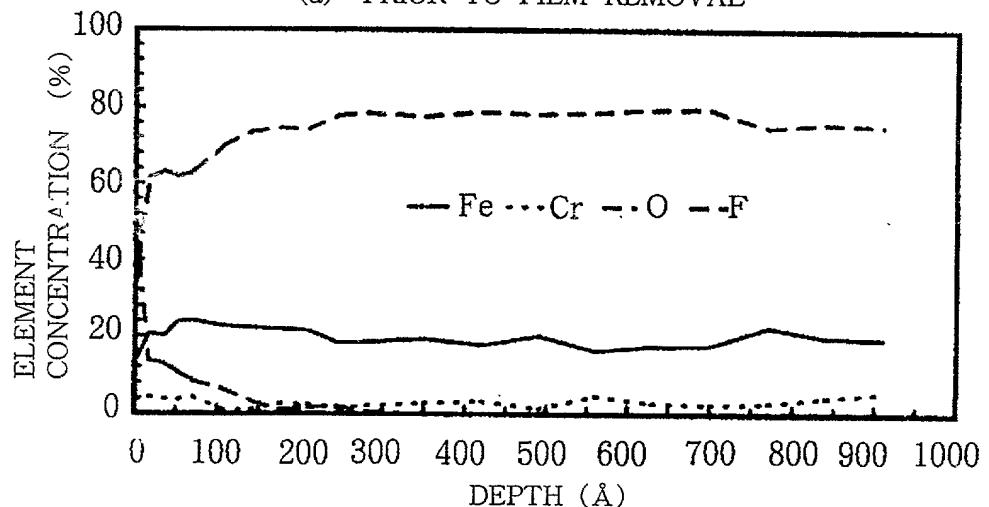
[BACK SHIELD GAS :  
5 % H<sub>2</sub>/Ar]

Fig. 6

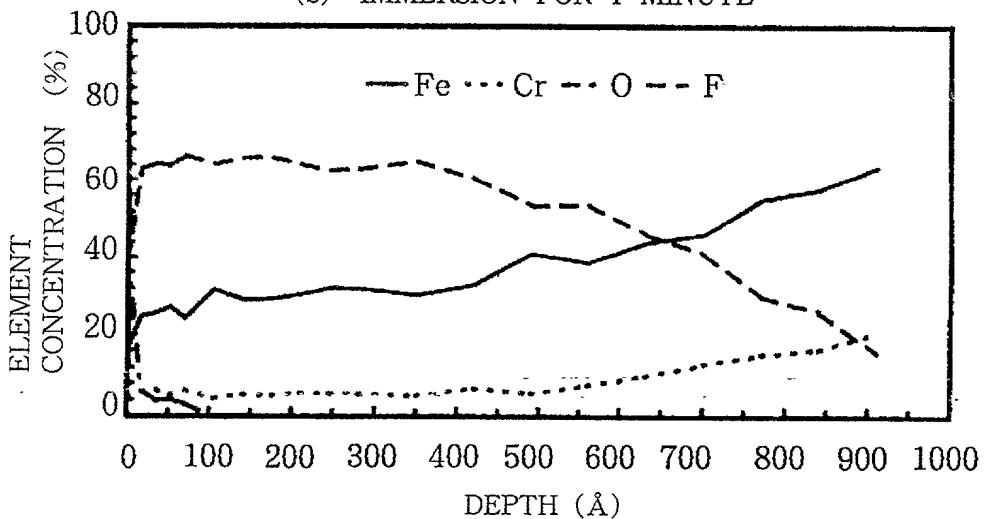
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REMOVAL OF FLUORIDE PASSIVATED  
FILM USING HOT WATER (80°C)

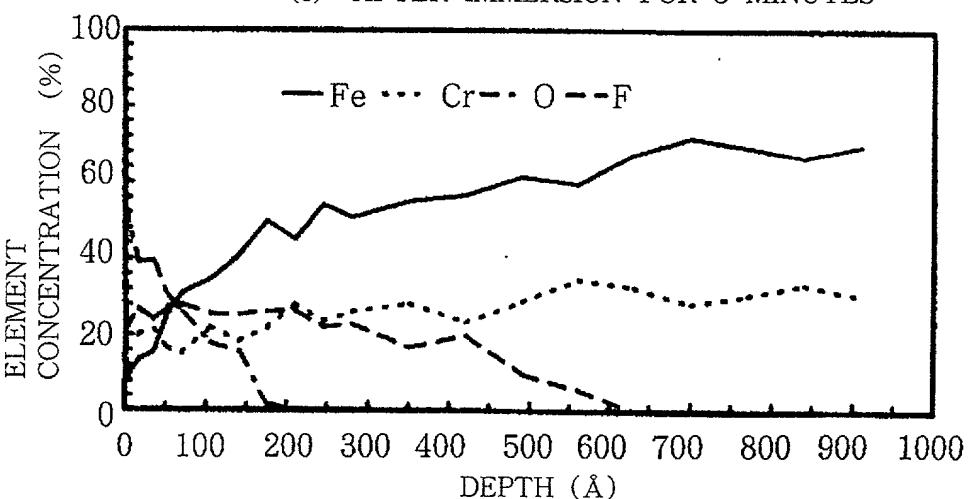
(a) PRIOR TO FILM REMOVAL



(b) IMMERSION FOR 1 MINUTE



(c) AFTER IMMERSION FOR 3 MINUTES

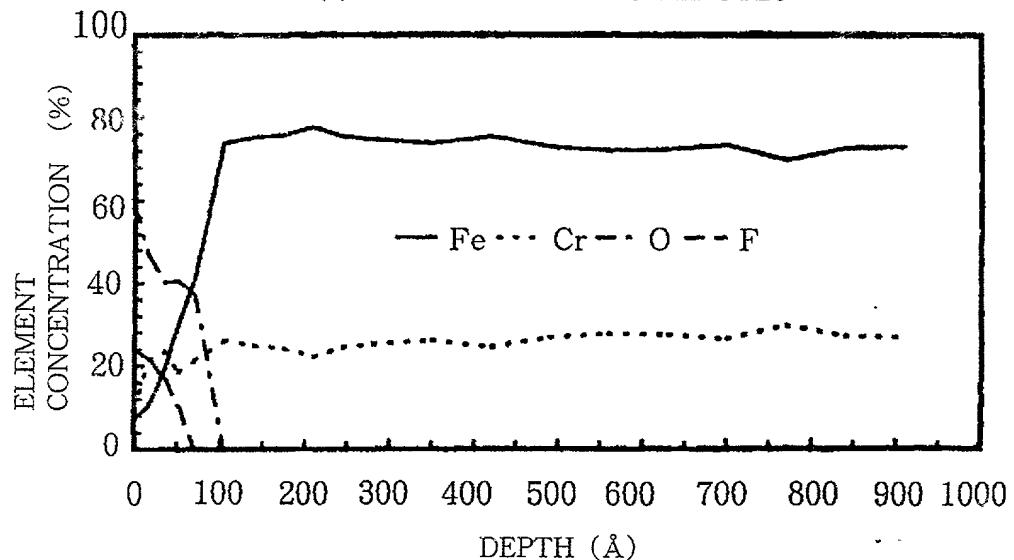


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REMOVAL OF FLUORIDE PASSIVATED  
FILM USING HOT WATER (80°C)

(a) IMMERSION FOR 5 MINUTES



(b) IMMERSION FOR 10 MINUTES

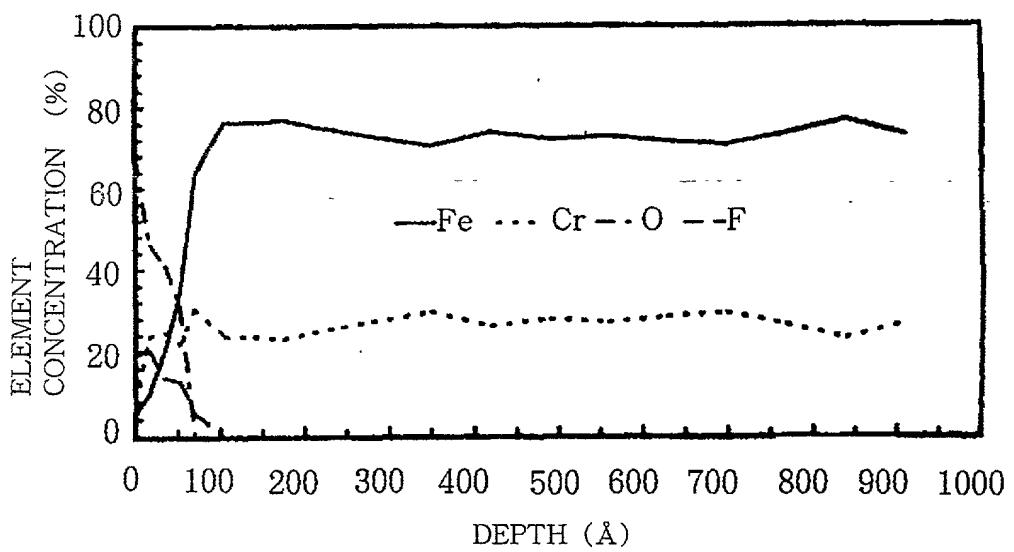


Fig. 8

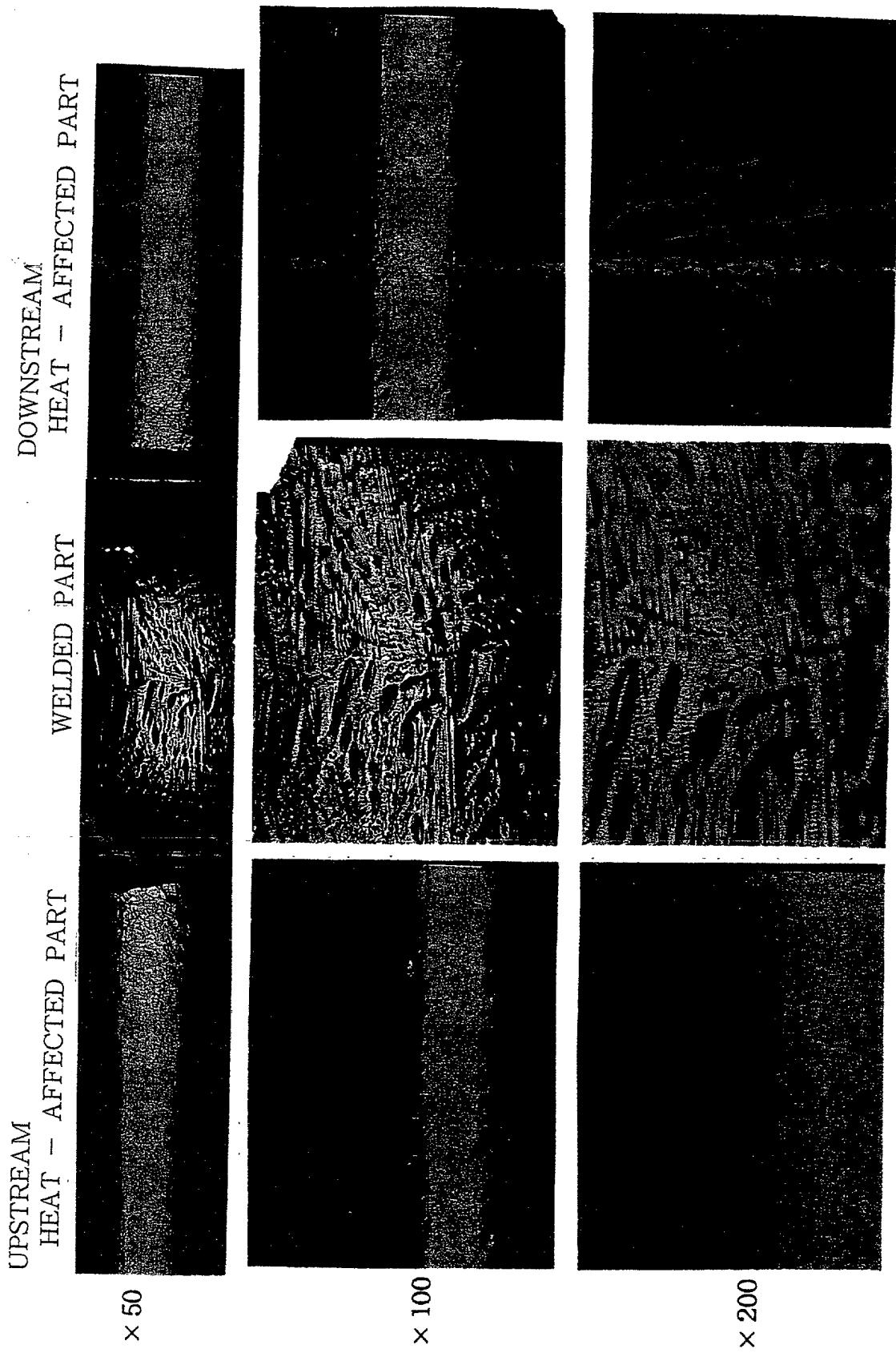
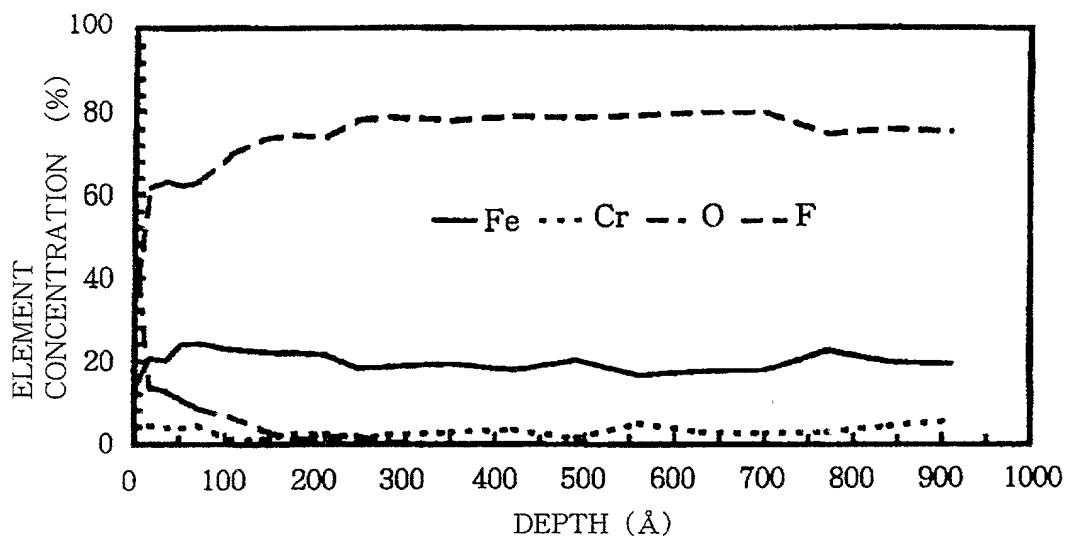


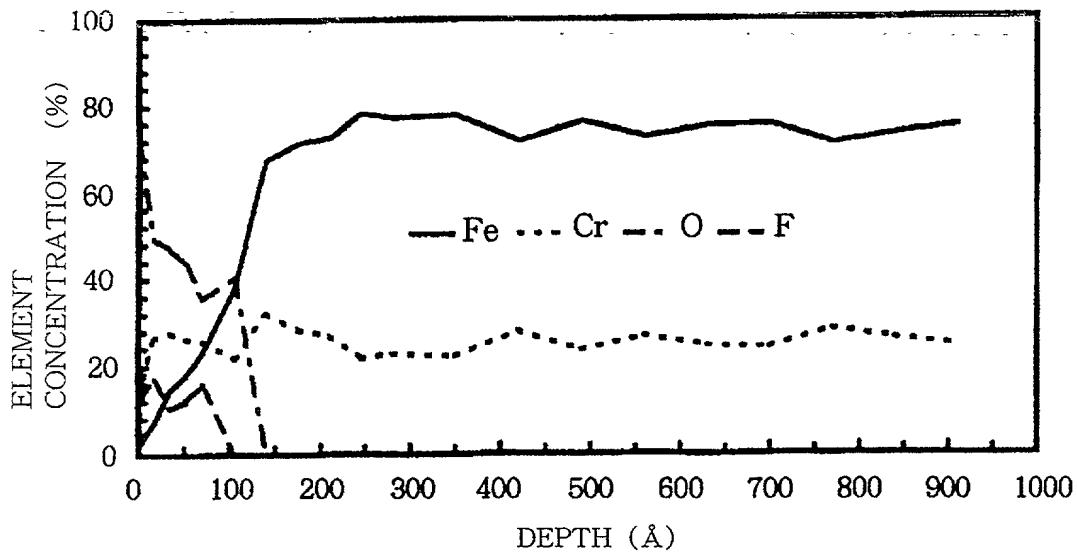
Fig. 9

REMOVAL OF PASSIVATED FILM USING A MIXED  
AQUEOUS SOLUTION OF 0.5% HYDROFLUORIC  
ACID AND 10% HYDROGEN PEROXIDE

(b) PRIOR TO FILM REMOVAL



(b) IMMERSION FOR 10 MINUTES

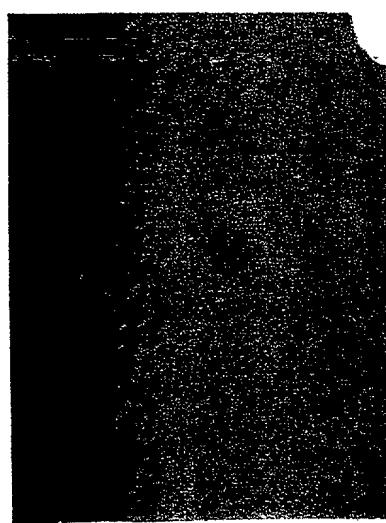


(IMMERION FOR 10 MINUTES IN  
A MIXED AQUEOUS SOLUTION  
OF 0.5% HYDROFLUORIC ACID  
AND 10% HYDROGEN PEROXIDE)  
UPSTREAM HEAT - AFFECTED PART

× 50

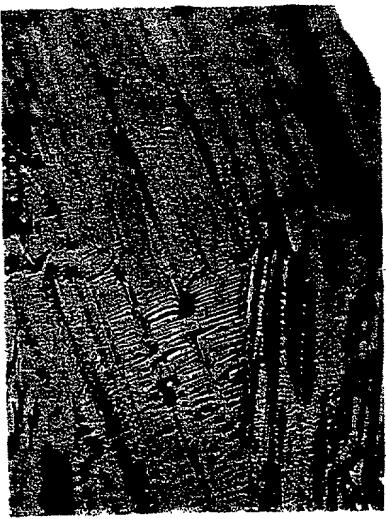
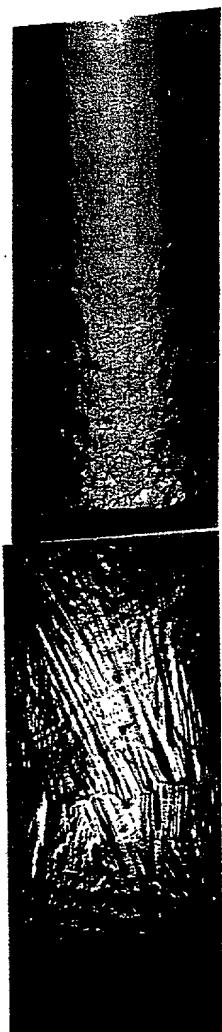


× 100



× 200

UPSTREAM HEAT - AFFECTED PART  
WELDED PART



DOWNTSTREAM  
HEAT - AFFECTED PART

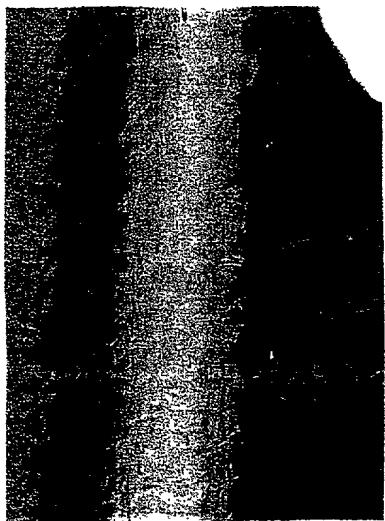


Fig. 10

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FLUORIDE PASSIVATION RETREATMENT  
OF THE WELDED PART  
 $1\% F_2/N_2$ , 20cc/min, 200C  $\times$  30min

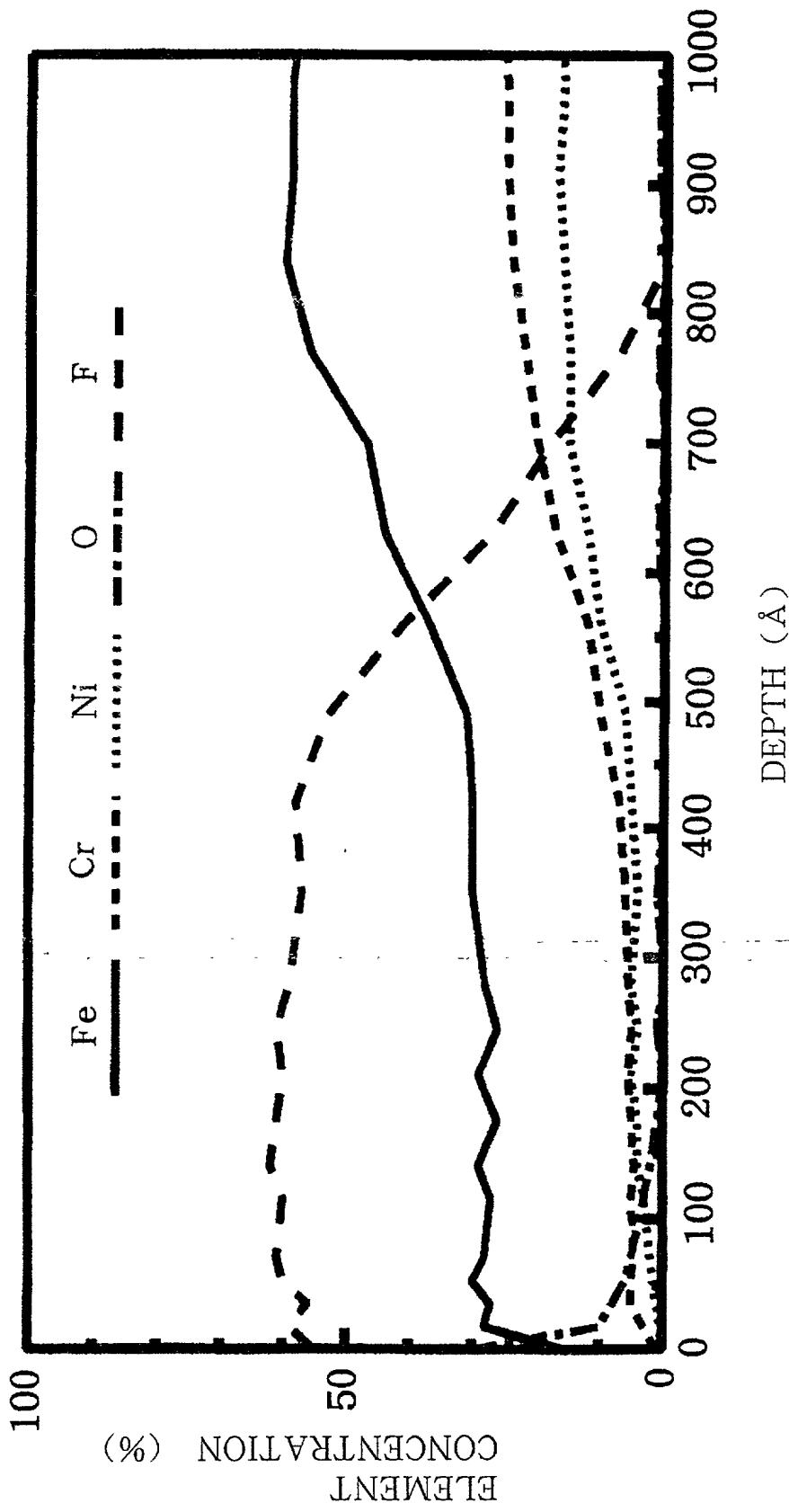
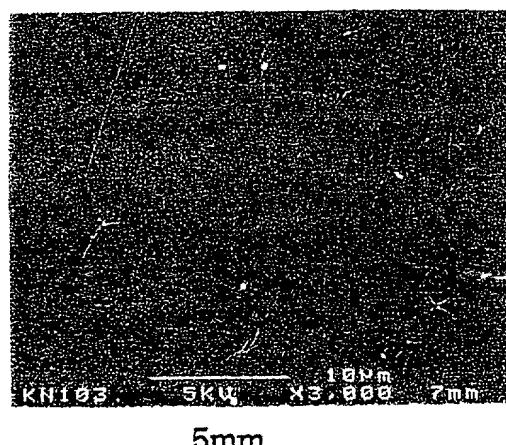


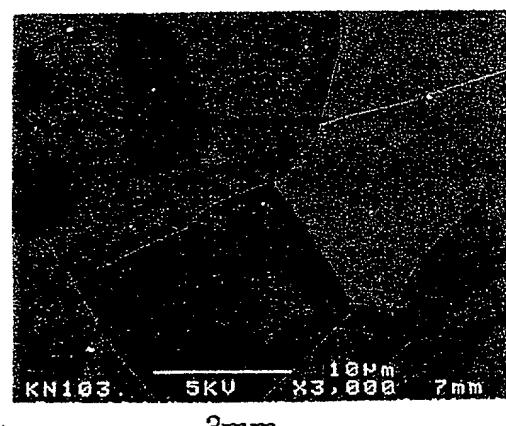
Fig. 12

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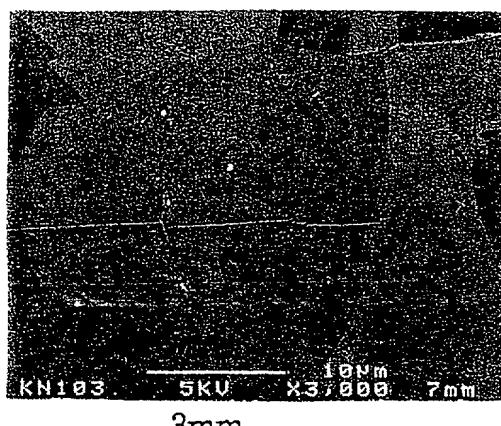
DOWNSTREAM



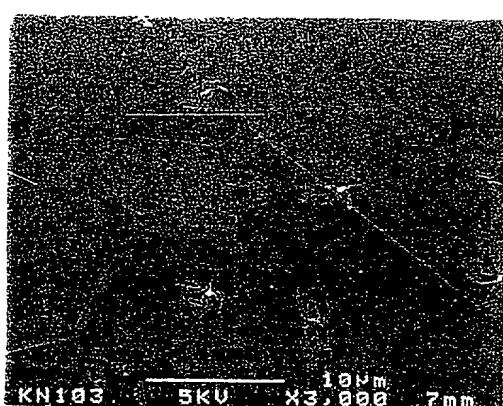
5mm



3mm

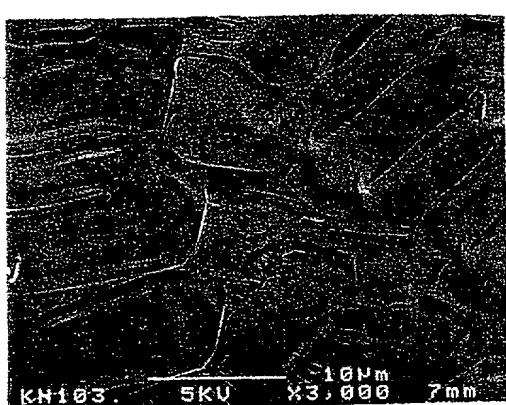


3mm



5mm

UPSTREAM



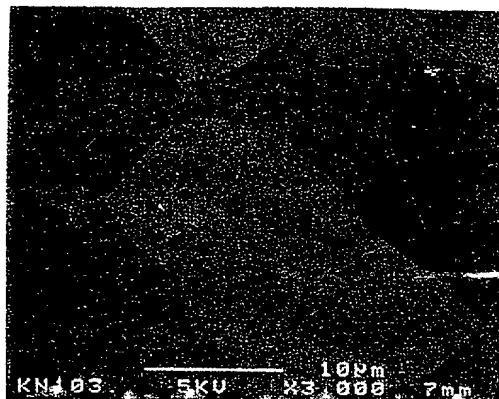
WELDED PART

[BACK SHIELD GAS :  
0.1% H<sub>2</sub>/Ar]

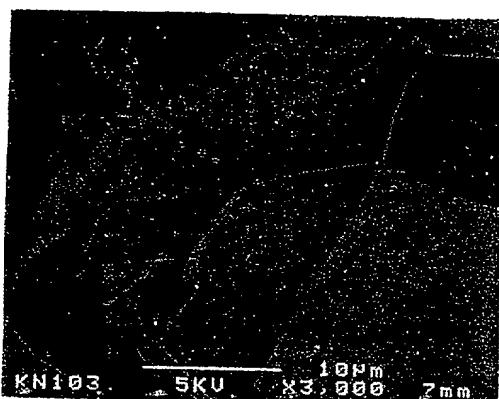
Fig. 13

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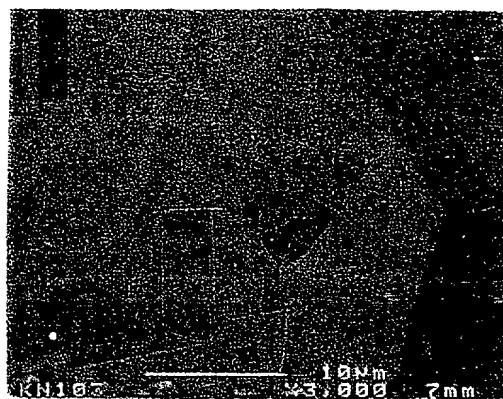
DOWNSTREAM



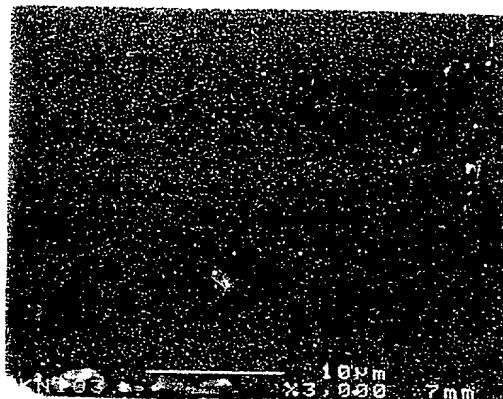
5mm



3mm

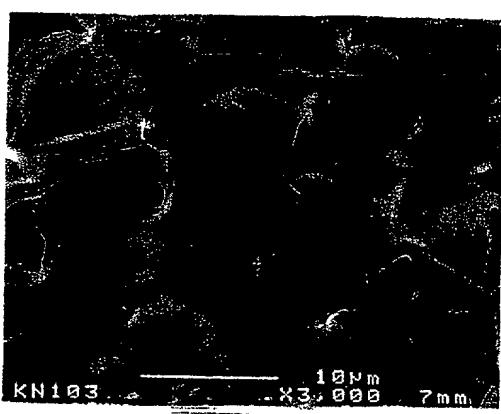


3mm



5mm

UPSTREAM



WELDED PART

[BACK SHIELD GAS :  
0.5% H<sub>2</sub>/Ar]